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Abandoned mine reclamation
bureau.

Final report Carbon County AML
statewide maintenance: Palmer ...

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FINAL REPORT

CARBON COUNTY AML STATEWIDE MAINTENANCE
PALMER PROJECT
CARBON COUNTY, MONTANA

DECEMBER 30, 1989

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FINAL REPORT

**CARBON COUNTY AML STATEWIDE MAINTENANCE
PALMER PROJECT
CARBON COUNTY, MONTANA**

DECEMBER 30, 1989

Prepared for: MR. STUART LEVIT
 Abandoned Mine Reclamation Bureau
 Montana Department of State Lands
 1625 Eleventh Avenue
 Helena, Montana 59620

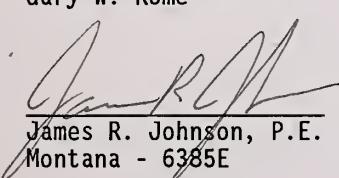
Prepared by: SPECTRUM ENGINEERING
 Mining & Civil Engineers
 3302 Fourth Avenue North
 Billings, Montana 59101

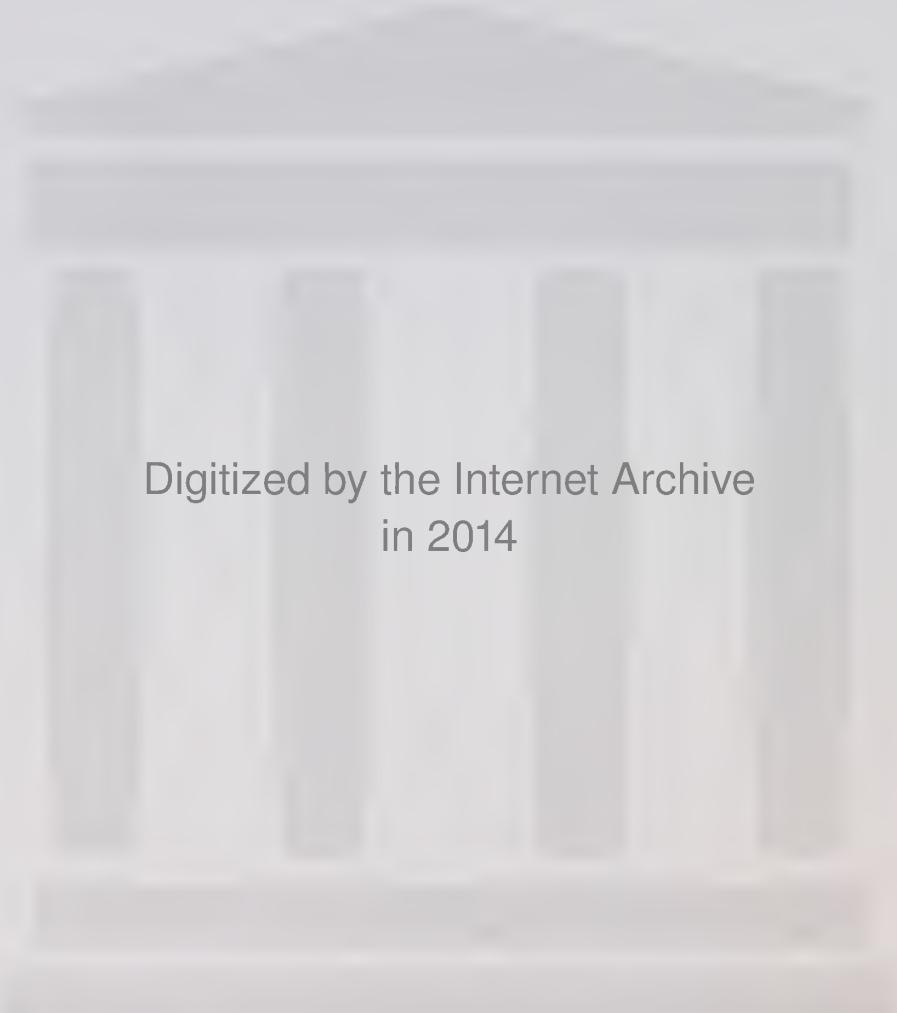
PROJECT ENGINEERS

James R. Johnson
Gary W. Rome

CONSTRUCTION INSPECTORS

Bill Wolff


James R. Johnson, P.E.
Montana - 6385E



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CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT

TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	Project Objectives	1
1.2	Site Description and Location	1
1.3	Land Ownership and Access	4
1.4	History and Past Mining Activity	4
2	DESCRIPTION OF RECLAMATION PROJECT	5
2.1	Site Hazards and Problems	5
2.1.1	Hayfield Subsidence Area	5
2.1.2	Unrevegetated/Weeded Areas	5
2.1.3	Clear Creek Subsidence Area	6
2.2	Project Planning	14
2.3	Chronological History	14
2.4	Equipment	15
2.5	Daily Construction Log	15
3	RECLAMATION PHOTOGRAPHS AND SLIDES	16
4	PROJECT COSTS	17
5	SUMMARY	17
5.1	Completed Reclamation	17
5.2	Comments	17
5.3	Recommendations	18
	APPENDIX A - CLEAR CREEK SUBSIDENCE AREA: RECLAMATION PHOTOGRAPHS . . .	19
	APPENDIX B - CLEAR CREEK SUBSIDENCE AREA: SLIDE DESCRIPTIONS	29

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT

1 INTRODUCTION

1.1 Project Objectives

Reclamation work was performed under the statewide maintenance program to backfill subsidence in an area that was previously mined by underground mining methods. Per verbal authorization on August 8, 1988 from Ben Mundie of Montana Department of State Lands to Spectrum Engineering in Billings, Montana, a field survey was to be performed to identify potential dangerous subsidence on the East Bench east of Red Lodge, Montana.

Previous AML reclamation activities in this area are thought to have been performed during 1984 by Swan Construction from Missoula, Montana. However, no construction plans or final construction report have been determined to exist.

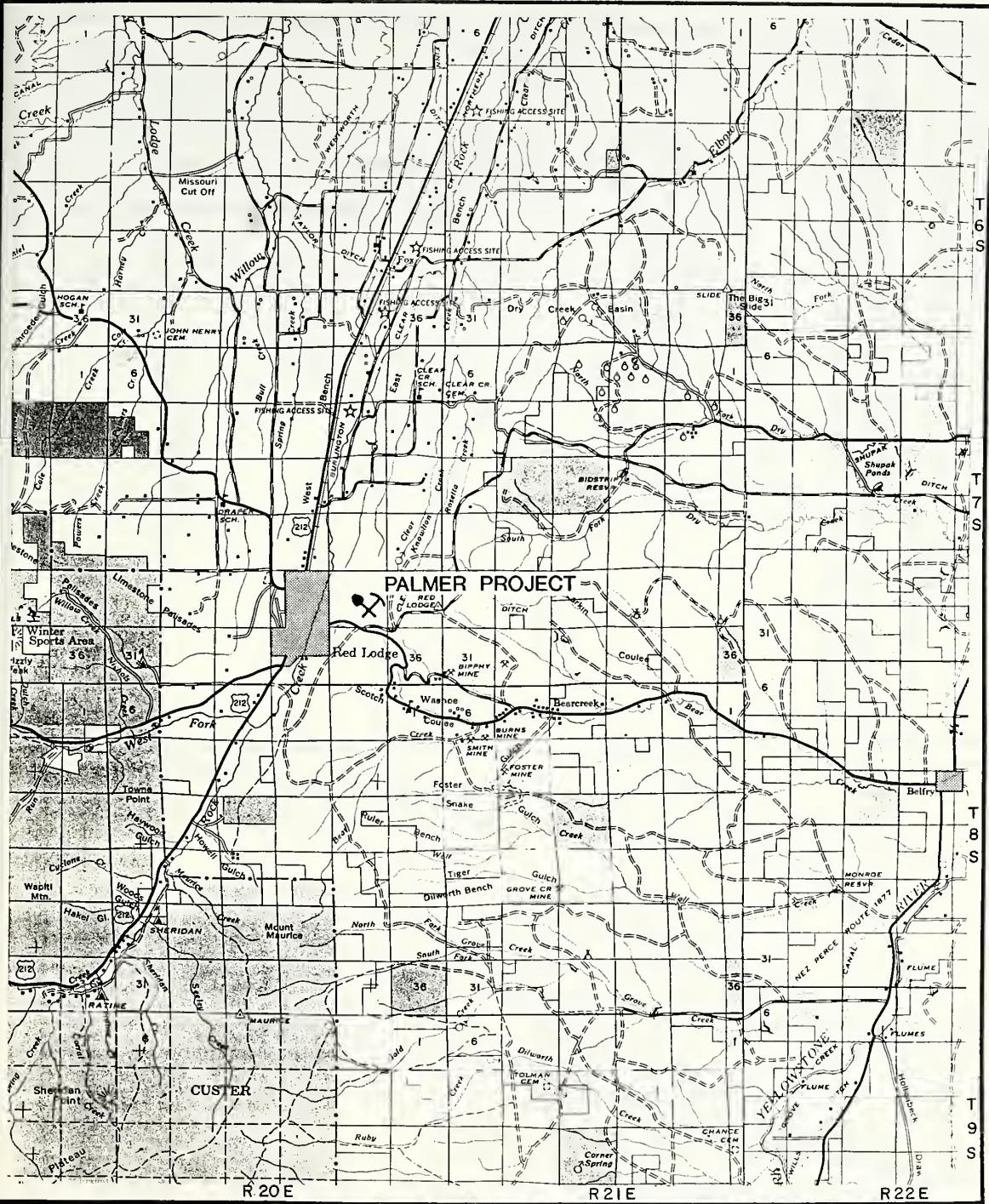
Initial on-site observations during August 1988 revealed four shallow subsidence depressions located in an irrigated hayfield, six areas where revegetation had failed as performed under the prior AML reclamation project, and several connecting subsidence depressions which intercepted the water course of a spring. All of the spring water flowing into the connecting subsidence depressions was disappearing into the apparently fractured ground beneath the area. No impounding of water was identified.

Re-routing of the spring and backfilling of the connecting subsidence depressions were performed. At the landowner's request, the four subsidence depressions which exist within his irrigated hay field were not backfilled. The unbackfilled subsidences are very shallow and pose no hazard to human life, livestock, or wildlife. Due to sufficient rainfall during the spring of 1989, it was found that native grasses and other vegetation had invaded those areas previously identified during the drought of 1988 as revegetation failures. Therefore, further disturbance and revegetation of these areas was deemed inappropriate.

1.2 Site Description and Location

The Palmer project consists of four shallow subsidence depressions within an irrigated hay field, four previously backfilled subsidence depressions and two borrow areas exhibiting revegetation failure (as noted during the drought of 1988) from a prior AML reclamation project, and several connecting subsidence depressions intercepting a spring. There is no debris at the site. The site area is located in the S $\frac{1}{2}$ of Section 26, Township 7 South, Range 20 East, Carbon County, Montana.

The Palmer project area is located approximately 1 mile east of Red Lodge, Montana, at the head of the Clear Creek drainage on the East Bench. The following vicinity and site maps depict the location of the project area and reclamation features.



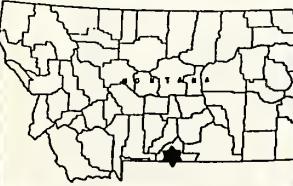
STATE OF MONTANA — DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU—RECLAMATION DIVISION

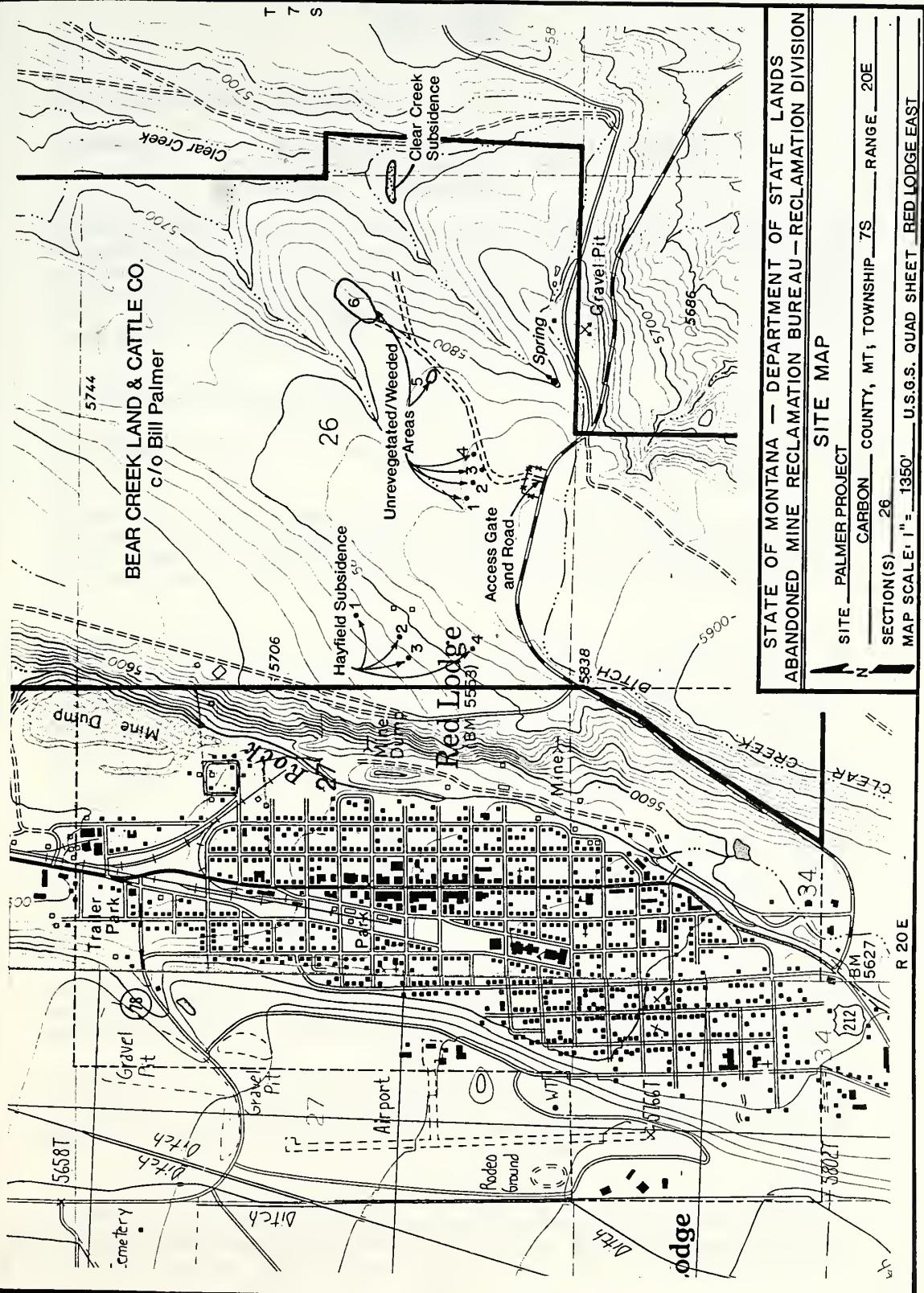
VICINITY MAP

SITE PALMER PROJECT

N CARBON COUNTY, MT; TOWNSHIP 7S RANGE 20E
SECTION(S) 26

MAP SCALE: 1" = 2.5 Miles







**CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT**

1.3 Land Ownership and Access

Landowner: Bill Palmer (Bear Creek Land & Cattle Co.)
P.O. Box 29, Red Lodge, Montana 59068
Phone: 406/446-1844

Access is obtained by traveling east out of Red Lodge on Route 382 for approximately 1½ miles to a pasture trail and barbed-wire gate in a fenced enclosure capable of holding livestock on the north side of the road. Proceed on pasture trail northeasterly about ¼ mile to the major subsidence area. The four hayfield subsidence depressions and six failed revegetation areas lay to the west of this pasture trail.

1.4 History and Past Mining Activity¹

The Palmer project area is located within the Red Lodge Coal field and mining area.

During the mid 1860's James "Yankee Jim" George discovered the coal along the east side of the Rock Creek drainage. These exposed coal seams became known as the Red Lodge coal field. Since there was no accessible market at the time, many years elapsed before there was suitable transportation to utilize this coal.

In 1882 the Northern Pacific Railroad completed its mainline along the Yellowstone River and on to Bozeman. This opened up prospects of developing a market for the Red Lodge coal. At this time "Yankee Jim" and other investors hauled two wagon-loads of coal from Red Lodge to Billings for promotional purposes. With the persistence of these investors and Henry Villard (a major investor in the Northern Pacific system), the Rocky Fork Coal Company was formed to mine the coal from the Red Lodge field to provide coal for the railroad.

Prior to 1889, the miner's used hand-steel and blackpowder and developed exploratory adits east into the main coal seams underlying the bench immediately east of the town of Red Lodge. With the completion of the Laurel to Red Lodge railroad in 1889, commercial mining got underway. Initial production in 1889 was 6,000 tons and expanded to over a million tons in 1920.

In 1922 the Northern Pacific Railroad prepared a study on alternative coal development. This study projected a lower coal cost by stripping coal from shallow deposits on Rosebud Creek some 30 miles south of Forsyth, Montana.

In 1924, this area which later became known as Colstrip, began mining and produced 3 million tons over the next five year period. As production rose at Colstrip, it forced production to cut back at Red Lodge, when in 1932 the mines produced only 54,000 tons and were subsequently closed.

¹ Anderson, Paul; Cultural Resource Inventory and Evaluation, Red Lodge East Bench-Washoe-Highway-Burns-Smith Mines; pg 8-10, May 6, 1983; Cultural Resource Division, GCM Services, Inc., Butte, MT.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT

2 DESCRIPTION OF RECLAMATION PROJECT

2.1 Site Hazards and Problems

The Palmer Project is subdivided into three distinct areas. These areas are: 1) Hayfield Subsidence Area; 2) Unrevegetated/Weeded Areas; and 3) Clear Creek Subsidence Area.

2.1.1 Hayfield Subsidence Area

The hayfield subsidence consists of four depressions that appear to have occurred as a result of past underground coal mining activity. These depressions exhibit subsidence from less than 6 inches to approximately 2 feet. No threat to human life, livestock, or wildlife is imposed by the existence of these features. The following is a brief description of each depression.

Hayfield Subsidence Depression 1 (Photos 1 & 2) is generally elliptical in shape measuring 60 feet long by 25 feet wide. Located within the north portion of the depression is a 4 feet by 5 feet hole having a depth of 2 feet. Subsidence depth (excluding the hole) is about 6 inches. Some hay crop vegetation has been established within the depression, but the density is sparse. Total affected area is approximately 0.03 acre.

Hayfield Subsidence Depression 2 (Photos 3 & 4) is nearly circular in shape measuring 36 to 40 feet in diameter. Maximum subsidence depth is 20 inches and averages about 12 inches. Sparse hay crop vegetation has been established within the depression. Total affected area is approximately 0.03 acre.

Hayfield Subsidence Depression 3 (Photo 5) is a circular depression approximately 30 feet in diameter exhibiting minor subsidence with a maximum depth of 18 inches. Sparse hay crop vegetation has been established within the depression. Total affected area is approximately 0.02 acres.

North of Hayfield Subsidence Depression 3 there is a possible mine related disturbance (see Photo 6). However, no subsidence was identified and the area poses no danger. No action was recommended for this area.

Hayfield Subsidence Depression 4 (Photos 7 & 8) is a circular area approximately 35 feet in diameter. No subsidence was noted. However, the area appears to have contained coal slack in the past. It is thought that the coal slack was disposed of during previous AML reclamation. The area is sparsely overgrown with thistles and other weeds. Total affected area is approximately 0.02 acres.

2.1.2 Unrevegetated/Weeded Areas

The Unrevegetated/Weeded Areas is composed of four areas which apparently contained subsidence backfill and two areas which appear to have been used as a source of borrow material. Very little topsoil presently exists upon these six areas. During the drought of the summer of 1988 these areas held

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT

very little revegetative grasses and were invaded with thistles and other weeds. These six areas are located on the East Bench east of the town of Red Lodge in range type pasture. No danger or threat of life is imposed by the presence of these areas. The following is a brief description of each area.

Unrevegetated/Weeded Area 1 (Photo 9) is an elliptical shaped area approximately 80 feet long by 44 feet wide. It is thought that this is a previously backfilled subsidence depression. Total affected area is approximately 0.07 acre.

Unrevegetated/Weeded Area 2 (Photo 10) is an elliptical shaped area approximately 110 feet long by 65 feet wide. It is thought that this is a previously backfilled subsidence depression. Total affected area is approximately 0.14 acre.

Unrevegetated/Weeded Area 3 (Photo 11) is an elliptical shaped area approximately 126 feet long by 78 feet wide. It is thought that this is a previously backfilled subsidence depression. Total affected area is approximately 0.19 acre.

Unrevegetated/Weeded Area 4 (Photo 13) is a circular shaped area approximately 17 feet in diameter. It is thought that this is a previously backfilled subsidence depression. Total affected area is less than 0.01 acre.

Unrevegetated/Weeded Area 5 (Photo 12) is a rectangular shaped area approximately 225 feet long by 75 feet wide. It is thought that this is a previous borrow area. Total affected area is approximately 0.32 acre.

Unrevegetated/Weeded Area 6 (no photo available) is a rectangular shaped area approximately 550 feet long by 230 feet wide. It is thought that this is a previous borrow area. It appears that no topsoil was applied to this area and that no prior revegetation effort was made. The area is covered with scattered rocks ranging from 3 inches to 18 inches in diameter. These rocks would have to be removed or covered with adequate topsoil before reseeding efforts could be performed. Total affected area is approximately 2.90 acre.

2.1.3 Clear Creek Subsidence Area

Clear Creek Subsidence Area (Photo 14) consists of several connecting subsidence depressions affecting a rectangular area approximately 450 feet long by 100 feet wide. The west end of the depressions intercepts the water course of a spring at the head of the Clear Creek drainage. The spring water runs into the subsidence depressions and flows eastward along the entire length of the depressions where the water then vanishes into the ground. The subsidence depressions appear to be relatively stable; however, it is expected that additional subsidence may occur in the future. The depth of the depressions range from 5 feet to a maximum of 10 feet.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



PHOTO 1 - Hayfield Subsidence Depression 1: Aerial view.



PHOTO 2 - Hayfield Subsidence Depression 1: Close up.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



PHOTO 3 - Hayfield Subsidence Depression 2: Aerial view.



PHOTO 4 - Hayfield Subsidence Depression 2: Close up.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



PHOTO 5 - Hayfield Subsidence Depression 3.



PHOTO 6 - Possible mine related disturbance: No Action.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



PHOTO 7 - Hayfield Subsidence Depression 4: Photo 1 of 2.



PHOTO 8 - Hayfield Subsidence Depression 4: Photo 2 of 2.



PHOTO 9 - Unrevegetated/Weeded Area 1.



PHOTO 10 - Unrevegetated/Weeded Area 2.



PHOTO 11 - Unrevegetated/Weeded Area 3.



PHOTO 12 - Unrevegetated/Weeded Area 5.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



PHOTO 13 - Unrevegetated/Weeded Area 4.



PHOTO 14 - Clear Creek Subsidence Area. (SLIDE 1)

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT

2.2 Project Planning

The scope of work at the Palmer Project was to perform the following tasks:

- 1) Backfill the four subsidence depressions in the hay field and revegetate with suitable hay seed mix.
- 2) Eradicate the weeds growing on the six failed revegetation areas, remove and dispose of rocks within Unrevegetated/Weeded Area 6, and reseed the six areas.
- 3) Divert the spring around the Clear Creek subsidence, backfill the subsidence depressions, and revegetate all disturbed area.

Project construction was initiated with the performance of Task 3. Following the completion of Task 3, the landowner requested that the four subsidence depressions within his irrigated hay field not be backfilled. Since these subsidence depressions are very shallow and pose no hazard to human life, livestock, or wildlife, this did not present a problem. In addition, as a result of sufficient snow and rainfall during early 1989, it was found that native grasses and other vegetation was beginning to establish within the unrevegetated areas identified during the drought of 1988. Therefore, further disturbance, rock removal, and revegetation of these areas was deemed impractical.

2.3 Chronological History

July 7, 1988 - Initial site identification occurred during aerial reconnaissance by Bill Wolff of Spectrum Engineering, Inc.

August 5, 1988 - A second aerial reconnaissance was performed by Jim Johnson of Spectrum Engineering and Ben Mundie from the Department of State Lands. Verbal authorization was given by Ben Mundie to proceed with mine maintenance work.

August 16, 1988 - An on-site inventory was performed by Jim Johnson and Bill Wolff, both of Spectrum Engineering. Mr. Bill Palmer, landowner, of Bear Creek Land and Cattle Co. accompanied and assisted in performing the on-site inventory. Verbal consent was given by Mr. Palmer to proceed with necessary field work.

September 7, 1988 - On-site engineering and field measurements were performed by Jim Johnson and Vern Hiesler, both of Spectrum Engineering.

October 5, 1988 - Landowner consent was obtained from Bill Palmer. Mr. Palmer indicated that he, as landowner, would be interested in acting as contractor to perform any construction activities.

November 22, 1988 - A letter was sent to Mr. Bill Palmer outlining the scope of work to be performed and requesting that he provide a lump sum cost estimate, list of equipment to be used, and work plan.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT

March 28, 1989 - A cost estimate and list of equipment was received from Mr. Bill Palmer to perform the previously described scope of work.

April 3, 1989 - Ben Mundie of Montana DSL was informed by Jim Johnson as to Mr. Bill Palmer's cost estimate and belief of it's reasonableness. Verbal consent was given by Ben Mundie to proceed with maintenance construction.

April 6, 1989 - A letter of authorization was given to and accepted by Mr. Bill Palmer to perform the maintenance work.

June 5, 1989 - Maintenance work began and proceeded through completion on June 29, 1989.

2.4 Equipment

1. Ford 5500 Backhoe with Loader Bucket;
2. Ford 5000 Farmhand Tractor and Loader;
3. D-6 Cat Dozer;
4. International Tractor with Landleveler, Disk Harrow and Seedbed Rake;
5. Ford 4x4 Pickup used to pull Herd Broadcast Spreader; and
6. Mulch Spreader (Mechanical Blower).

2.5 Daily Construction Log

All of the following construction activities occurred in the Clear Creek Subsidence Area.

June 5, 1989 - Construction Inspector: Gary Rome.
Stripped and stockpiled (windrowed) topsoil. Slot dozed borrow material into west portion of subsidence depressions with D-6 dozer and used Farmhand tractor to spread and compact borrow in depressions. Fill was sandy with adequate moisture content to achieve satisfactory compaction when placed in 4 inch to 8 inch lifts.

June 6, 1989 - Construction Inspector: Gary Rome.
Completed backfilling first subsidence depression. Developed second borrow slot by stripping and windrowing topsoil. Started to backfill main subsidence depression.

June 7, 1989 to
June 8, 1989 - Construction Inspector: Gary Rome.
Continued with slot dozing borrow and backfilling main subsidence depressions. Expanded borrow area as required by stripping and windrowing topsoil. D-6 Dozer broke down: work stopped early.

June 12, 1989 - Construction Inspector: Gary Rome.
Called Bill Palmer to ensure crew was working. Drove to site to find Dozer still broke down. The weather was raining. Bill

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT

Palmer inquired about locating the spring stream channel to the lowest valley elevation. Agree to layout new stream channel the next day.

June 13, 1989 - Construction Inspector: Gary Rome.
Mapped and staked the relocated spring stream channel.
Discussed stream channel construction with Bill Palmer.

June 19, 1989 - Construction Inspector: Bill Wolff.
Constructed new stream channel and diverted spring. Borrow and subsidence backfill activities were completed. Spreading of topsoil was started.

June 22, 1989 - Construction Inspector: Bill Wolff.
Continued with spreading of topsoil.

June 23, 1989 - Construction Inspector: Bill Wolff.
Dressed rough areas using Ford Tractor with loader bucket.
Topsoil was dressed using International Tractor and Landleveler.

June 24, 1989 - Construction Inspector: Bill Wolff.
Bill Palmer delivered 3 Ton of hay mulch to the site. Spread fertilizer over 2.51 acres at the application rate of 143.4 pounds per acre.

June 28, 1989 - Construction Inspector: Bill Wolff.
Broadcast seed using Herd Broadcast Seeder at an application rate of 49 pounds per acre. Raked seed into seedbed. Began blowing hay mulch onto seeded area. The drive belts on the Mulch Spreader broke, work was stopped for repairs.

June 29, 1989 - Construction Inspector: Jim Johnson.
Completed belt repairs on the Mulch Spreader. Completed spreading of hay mulch. Crimped mulch into seedbed.

3 RECLAMATION PHOTOGRAPHS AND SLIDES

Photographic prints of the slides taken to document the work performed at the Clear Creek Subsidence Area are found in Appendix A. The slide descriptions are found in Appendix B. The slides are included with one volume of this report provided to the Abandoned Mine Reclamation Bureau, Montana Department of State Lands.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT

4 PROJECT COSTS

A summary of the costs to perform this statewide maintenance project are as follows:

Professional Services:

Project Administration	\$ 2,652.72
Site Inventory and Engineering	2,586.20
Construction Inspection	4,079.06
Final Report	<u>2,295.03</u>
Total Professional Services	\$11,613.01

Construction Costs:

Contractor - Bill Palmer	\$12,380.00
Fertilizer	46.80
Seed	1266.30
Hay Mulch	<u>135.00</u>
Total Construction Cost	\$13,828.10

Percentage of Professional Services to Construction Cost: 84.0%

Professional Services provided include courthouse deed search for land ownership, landowner contact and consent, site inventory, basic engineering, project administration, and full time construction and reclamation inspection.

5 SUMMARY

5.1 Completed Reclamation

The Contractor (Bill Palmer, landowner) completed the backfilling and reclamation of the Clear Creek Subsidence Area. The landowner indicated that he desired not to have the hay field subsidence depressions backfilled and unrevegetated/weeded areas left undisturbed. He felt that reclamation of these areas would only result in unnecessary disturbance. This was acceptable since the depressions do not present a danger and that native vegetation was starting to establish itself. Therefore, the Contractor was not paid for these items.

5.2 Comments

All construction work was completed by the Contractor (landowner) as specified and directed by the site inspector. Spectrum Engineering assisted with the spring stream channel relocation and the spreading of fertilizer, seed, and hay mulch.

The work proceeded as planned with no unusual situations occurring. The only delays were equipment breakdowns and subsequent time for repairs.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT

APPENDIX A

CLEAR CREEK SUBSIDENCE AREA
RECLAMATION PHOTOGRAPHS
(Prints from Slides)

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



SLIDE 2 - Clear Creek Subsidence Area (looking west).



SLIDE 3 - Clear Creek Subsidence Area (looking east).

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



SLIDE 4 - Dozer borrow slot (looking south).



SLIDE 5 - Slot dozing borrow.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



SLIDE 6 - Dozer in borrow slot.



SLIDE 7 - Borrow and backfill activity.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



SLIDE 8 - Placement and compaction of backfill.



SLIDE 9 - Backfill activity.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



SLIDE 10 - Placement and compaction of backfill.



SLIDE 11 - Borrow area on west end.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



SLIDE 12 - Relocated spring stream channel.



SLIDE 13 - Backfill and borrow operation complete.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



SLIDE 14 - Compacted backfill ready for topsoil.



SLIDE 15 - Topsoil spreading operation complete.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



SLIDE 16 - Closeup of topsoil in place.



SLIDE 17 - Herd Broadcast Spreader.

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT



SLIDE 18 - Broadcast spreader and seed rake apparatus.



SLIDE 19 - Mulch Spreader.



**CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT**

APPENDIX B

**CLEAR CREEK SUBSIDENCE AREA
SLIDE DESCRIPTIONS**

CARBON COUNTY MAINTENANCE
PALMER PROJECT
FINAL REPORT

CLEAR CREEK SUBSIDENCE AREA
SLIDE DESCRIPTIONS

<u>SLIDE NUMBER</u>	<u>DATE TAKEN</u>	<u>SUBJECT OR COMMENTS</u>
1	5/9/89	Clear Creek Subsidence Area, looking west.
2	5/9/89	Clear Creek Subsidence Area, looking west.
3	5/9/89	Clear Creek Subsidence Area, looking east.
4	6/5/89	Dozer borrow slot, looking south.
5	6/5/89	Slot dozing borrow.
6	6/6/89	Dozer in borrow slot.
7	6/6/89	Borrow and backfill activity.
8	6/6/89	Placement and compaction of backfill.
9	6/6/89	Backfill activity.
10	6/6/89	Placement and compaction of backfill.
11	6/6/89	Borrow area on west end and backfilled subsidence.
12	6/19/89	Relocated spring stream channel.
13	6/19/89	Backfill and borrow operation complete.
14	6/19/89	Compacted backfill ready for topsoil.
15	6/23/89	Topsoil spreading operation complete.
16	6/23/89	Topsoil in place.
17	6/24/89	Herd Broadcast Spreader.
18	6/28/89	Broadcast spreader and seed rake apparatus.
19	6/28/89	Mulch Spreader.





